Explosives Safety (Deployment)

Tri-Service Conference

Garmisch, Germany

4-8 April 2005

DoD Explosive Safety

DExplosive Safety

Camp Doha, Kuwait

"Most expensive Army Ground Accident in History."

- ✓ **11 July 1991**
- ✓ **Uploaded Vehicles closely grouped**
- ✓ **Caused by FAASV Heater Fire**

Deaths and Injuries:

3 Fatalities (during clean-up)

50 Injuries

Assets Lost: ($40Million)

4 Abrams Tanks

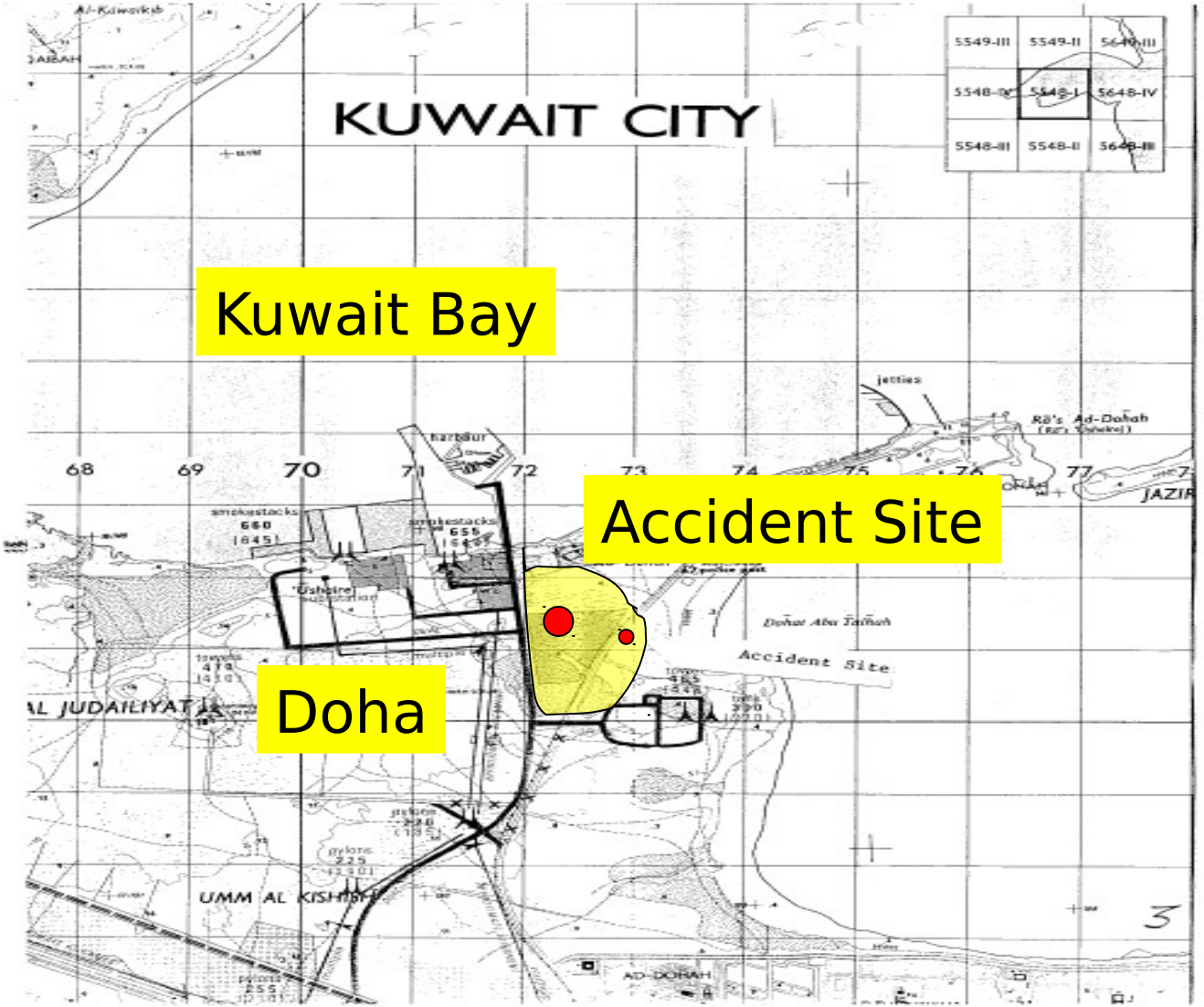
7 M109 Howitzers

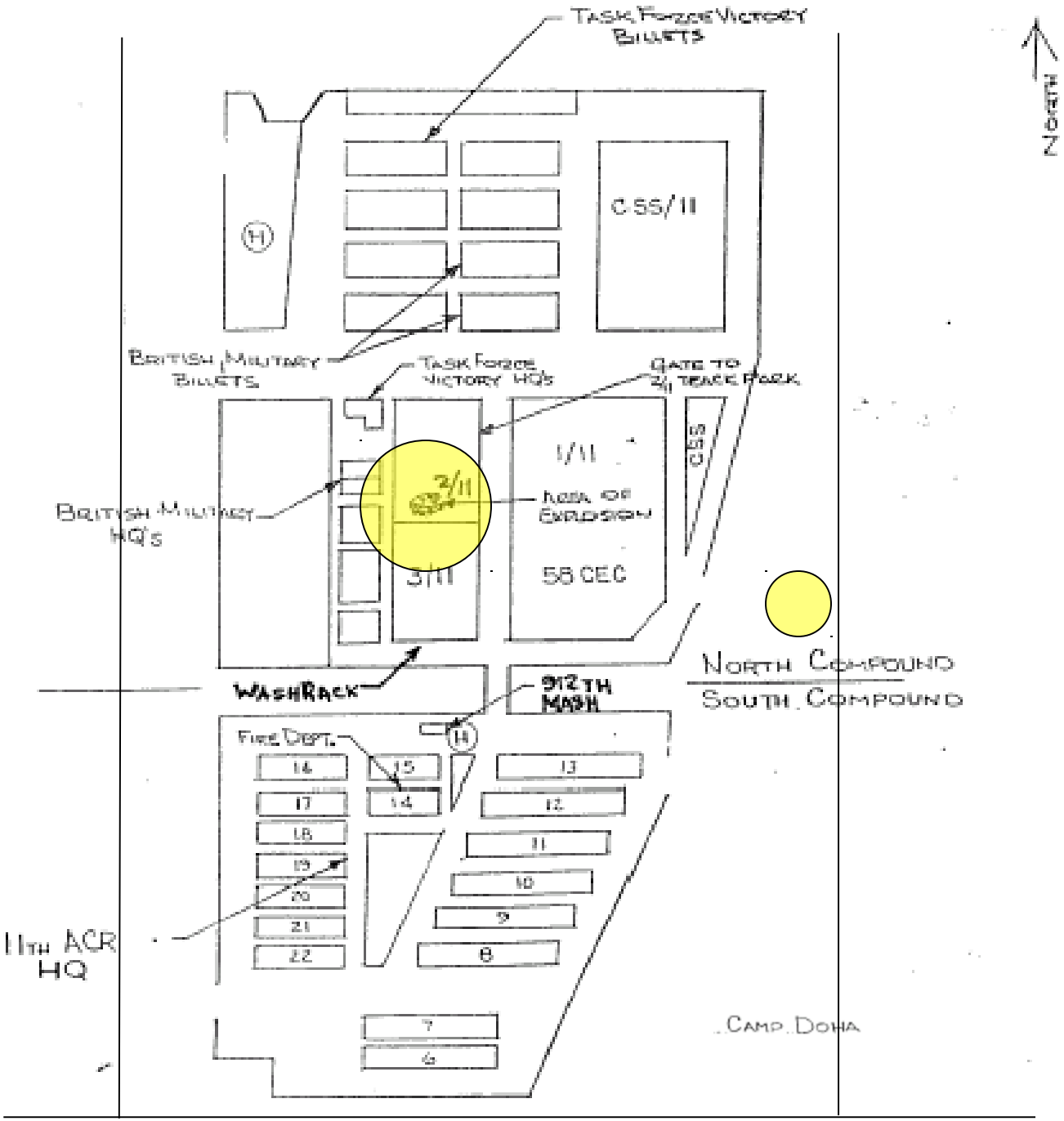
7 FAASVs

4 AVLB

40 Smaller Vehicles

Explosive Safety




TASK FORCE VICTORY BILLETS
NORTH
C 55/11
H1
BRITISH MILITARY BILLETS
TASK FORCE VICTORY HQ'S
GATE TO 2/11 TRACK PARK
1/11
C55
3/11
AREA OF EXPLOSION
BRITISH MILITARY HQ'S
3/11
58 CEC
WASHRACK
912TH MASH
NORTH COMPOUND
SOUTH COMPOUND
FIRE DEPT.
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CAMP DOHA

Explosive Safety

DOD Explosive Safety

Explosive Safety

Explosive Safety

Explosive Safety

- ✓ Quantity Distance (QD) is not user friendly
- ✓ Safety Personnel make solutions that are depot oriented
- ✓ Need to tailor solutions to unit organizations
- ✓ The required distances from ammunition storage to non-associated facilities are large, often not attainable in a base camp situation
- ✓ The Army needs to stop trying to teach QD to troops and do it for them

Basic Concepts

- ✓ All compatibility groups may be mixed in storage
- ✓ Allows storage of a unit's ammunition in one location
- ✓ Allows for the dispersion of ammunition assets
- ✓ Only applies to Basic Load ammunition
- ✓ Does not apply to training ammunition

DDESB Explosive Safety

- ✓ **Limit of 4000 kgs (8800 lbs) NEW per site**
  - **Can have multiple 4000 kgs sites at one location**
- ✓ **Computation of NEW is done differently**
  - **Only high explosives content is added to determine NEW**
  - **HD 1.3 and 1.4 are not added to the explosives weight computation**
  - **The propellant weight of HD 1.3 need not be**

NEW Computation Comparison

Example, 25 ea, D563 (DPICM), NEW 2.89 kgs = 72.25 kgs

20 ea, D533 (White Bag), NEW 10.08 kgs = 201.6 kgs

20 ea, D540 (Green Bag), NEW 6.35 kgs = 127 kgs

NEW per Chapter 5 (Ammo Plant QD) is 400.85 kgs

NEW per Chapter 14 (Deployment QD) is 72.25 kgs

DDESB Explosive Safety

Slight Distance Reduction

- ✓ Chapter 5 has a minimum default fragment distance of 1250 ft (381 m) for quantities of up to 30,000 lbs (13,636 kgs)

- ✓ Chapter 14 has a minimum default fragment distance of 886 ft (270 m) for quantities of up to 5,000 lbs (2,500 kgs) to internal, Army controlled sites (HQ, barracks, PX etc.). The 1250 ft (381 m) default fragment distance still applies to off installation sites (local national homes, businesses, etc).

Armor Class Benefit

- ✓ Chapter 5 deals with earth-covered magazines, above-ground magazines and operating buildings. Not a good fit to an armored vehicle.
- ✓ Chapter 14 has:
  - ✓ Heavy Armor – Expected to resist external explosion and largely contain an internal explosion
  - ✓ Light Armor – Expected to resist an external explosion and not contain an internal explosion – the light armor is expected to serve as a barricade for QD purposes
  - ✓ Non-Armored – Not expected to resist or contain an explosion

Explosive Safety

Armor Class Benefit

- Heavy Armor – Abrams series tanks, Bradley if only uploaded with 25mm – hatches must be closed
- Light Armor – M109 Howitzer, M113 Series vehicles, Bradley uploaded with TOW missiles, M270 MLRS launch vehicle from the front and sides – hatches must be closed
- Non-Armored – MILVANs, uploaded trucks, trailers, helicopters, M270 launch vehicle from the rear

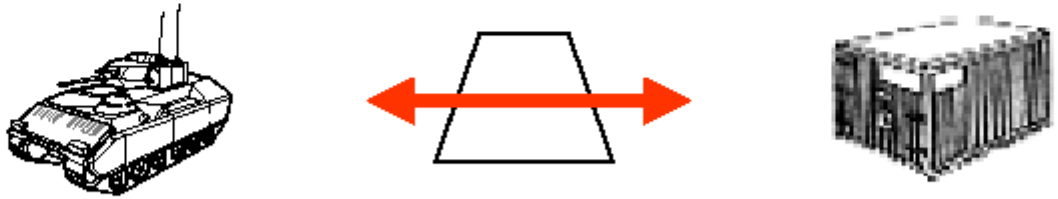
DOD Explosive Safety

- ✓ Table 14-1 is the heart of Deployment Quantity Distance
- ✓ It has 6 columns, D1 through D6

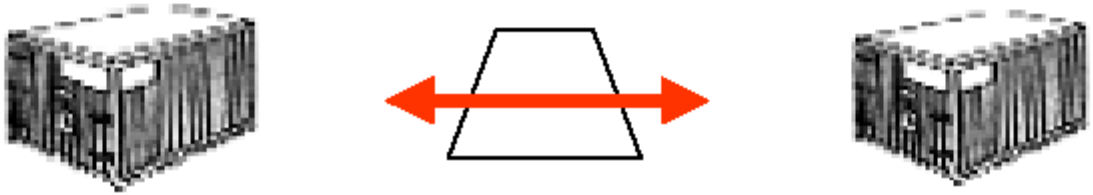
D1 is used for separations between

- ➢ Light Armor to Light Armor barricade is not necessary

- ➢ Light Armor to Non-Armored if a barricade is present



- ➢ Non-Armored to Non-Armored if a barricade is present

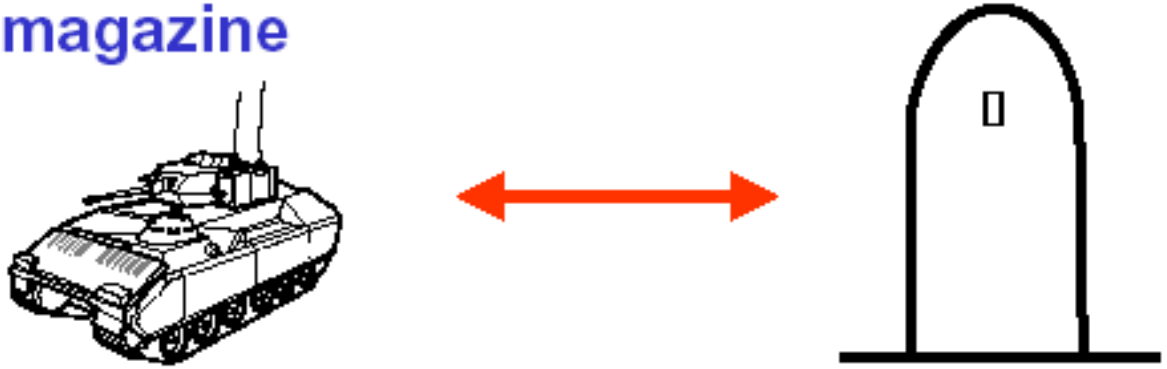


Explosive Safety

Column D-2 is used for:

- ✓ Front to Front facing of undefined earth-covered magazines with a barricade

- ✓ Light Armor to the side or rear of an earth-covered magazine



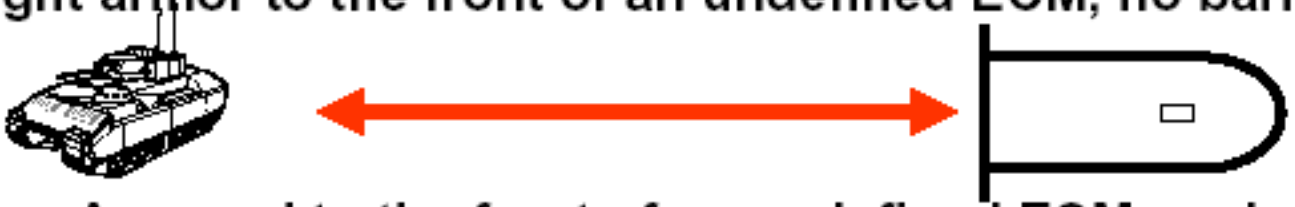
Explosive Safety

Column D-3 is used for:

- ✓ Light armor to Non-Armored no barricade present

- ✓ Non-Armored to Non-Armored no barricade present

- ✓ Light armor to the front of an undefined ECM, no barricade

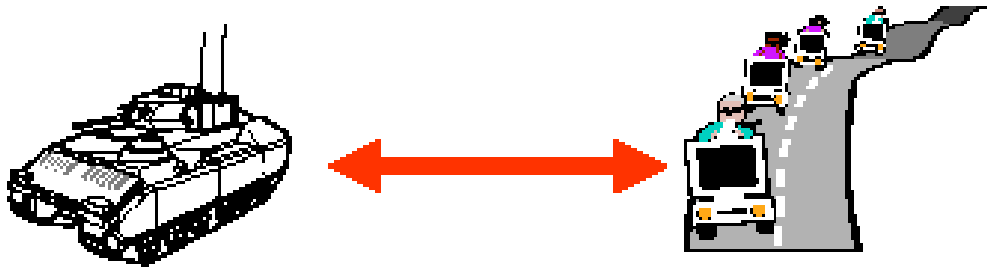


- ✓ Non-Armored to the front of an undefined ECM, no barricade

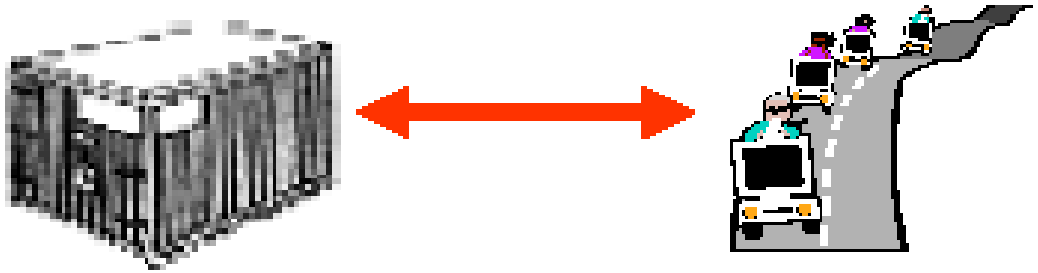
Explosive Safety

Column D-4 is used for:

- ✓ Light armor to a public traffic route



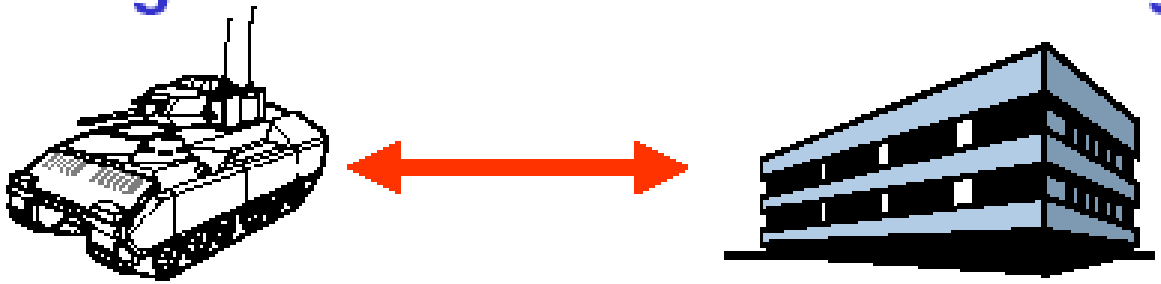
- ✓ Non-armored to a public traffic route



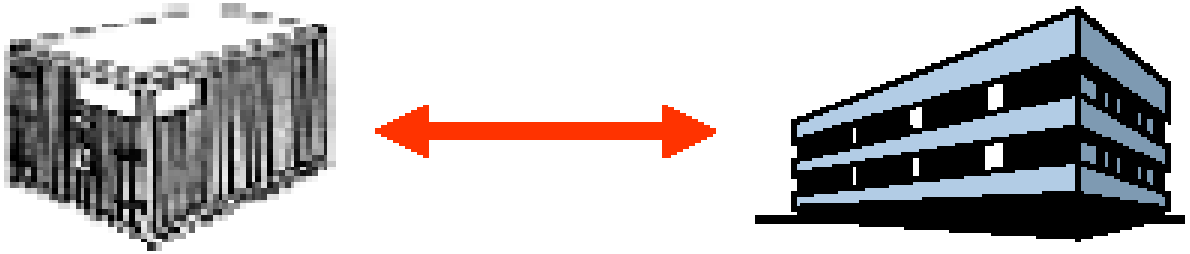
Explosive Safety

Column D-5 is used for:

- ✓ Inhabited Building separations:
  - Light armor to inhabited buildings



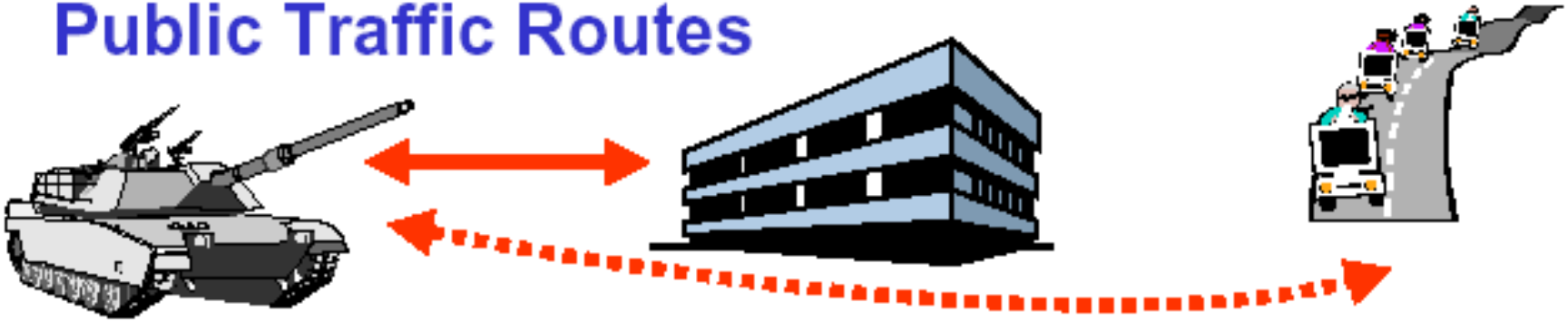
  - Non-Armored to inhabited buildings



DOD Explosive Safety

Column D-6 is used for:

✓ Heavy Armor to Inhabited Buildings or Public Traffic Routes



NOTE: Heavy Armor only requires a small external seperation…it does not require internal seperations.

Explosive Safety

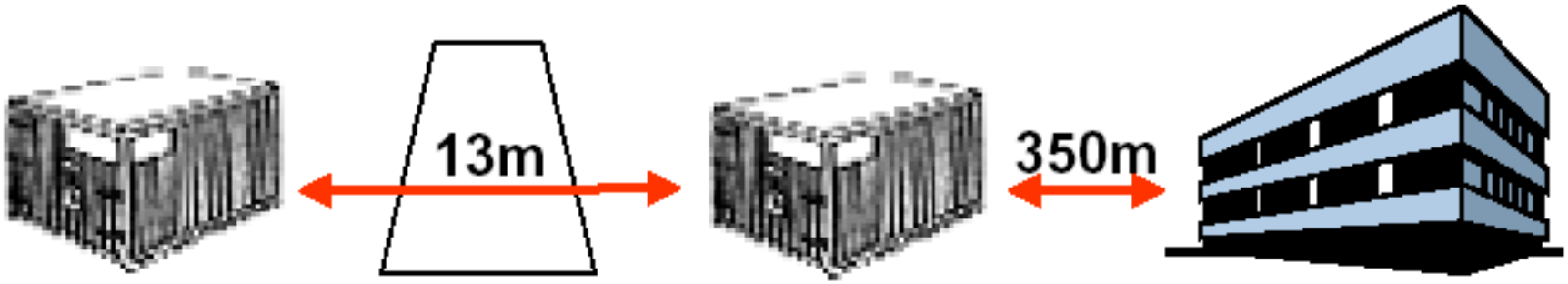
- Basic Load Holding Areas
  - No single site can exceed 8800 lbs (4000 kgs)
  - An area can have multiple 8800 lbs (4000 kgs) sites
- Barricades greatly decrease the internal distances – barricades do not decrease the external distances
  - Applies only to Basic Load ammunition
  - Compatibility groups can be mixed

Explosive Safety

Explosive Safety

Assume 4000 kgs
Per site

Barricade Benefit, BLAHA QD



Explosive Safety

Lessons Learned - USAREUR Recommends that Hesco Bastions be used in front of uploaded helicopters

Hesco Bastion hit by a Hellfire Missile

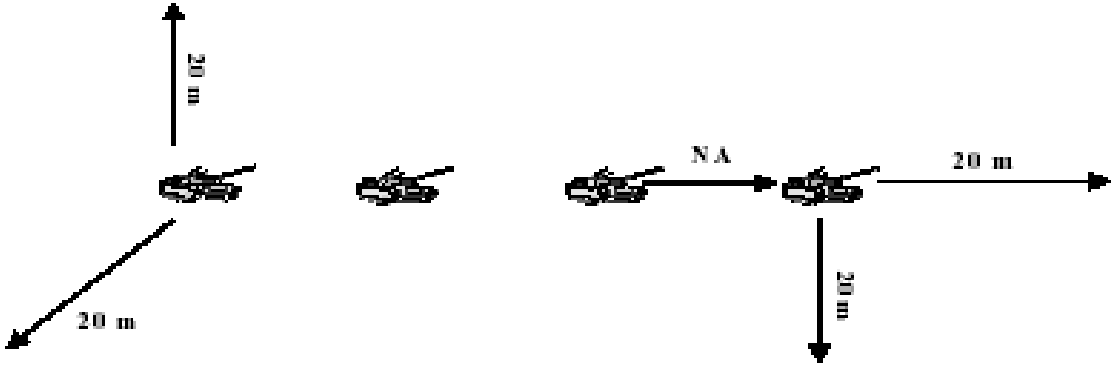
Explosive Safety

Uploaded Vehicles

- Solutions must incorporate unit organization to be used
- There may be a mix of heavy armor, light armor and non-armored in the unit.
- USATCES prepared a booklet to do QD for common units
- Required separations will often exceed available real estate

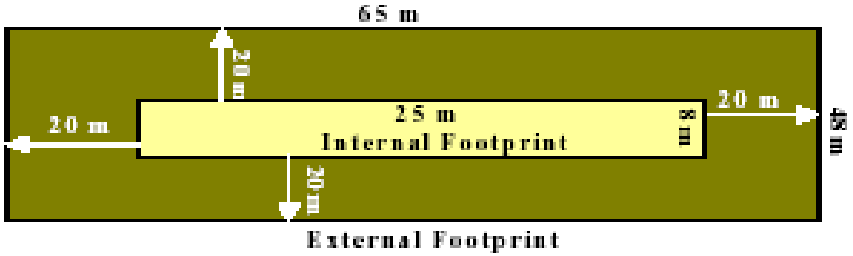
Explosive Safety

M1 TANK PLATOON, LINE TEMPLATE



NOTE: No separation is required between uploaded M1 tanks, however this template uses a 3 meter separation.

These M1 tanks require a 20 meter separation to the installation boundary, inhabited buildings such as headquarters, post exchange, mess hall, fuel points, motor pools or installation critical facilities.



External Footprint

This template is based on a load of 25 HEAT and 15 sabot rounds. This gives a maximum credible event of no more than 50 kilograms. Fewer HEAT and more sabot rounds do not affect the external footprint. More HEAT and fewer sabot rounds will require a greater external footprint.

Appendix D

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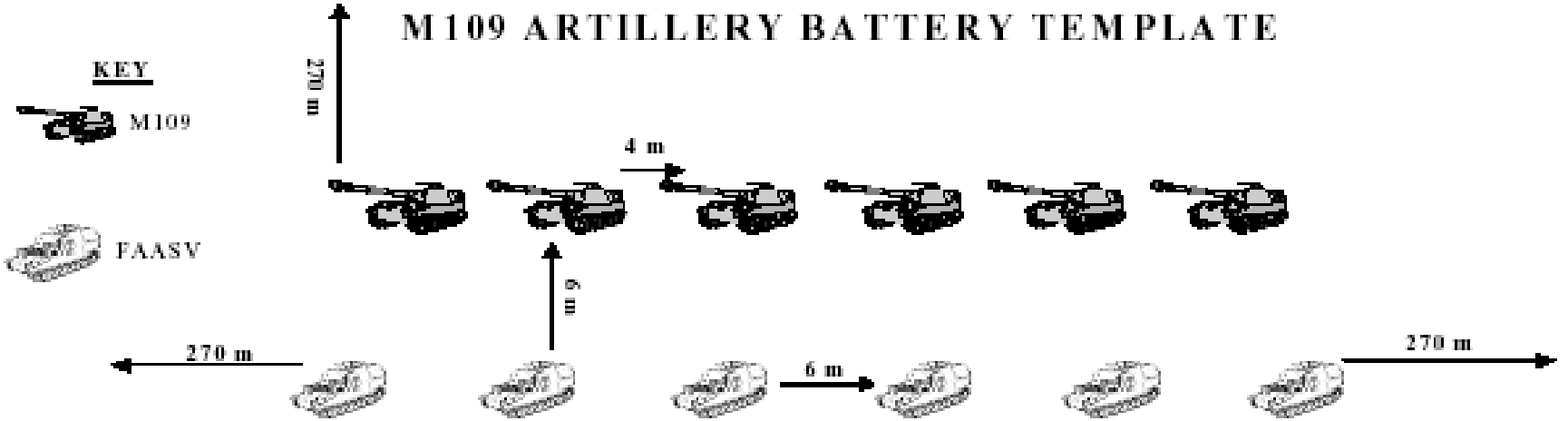
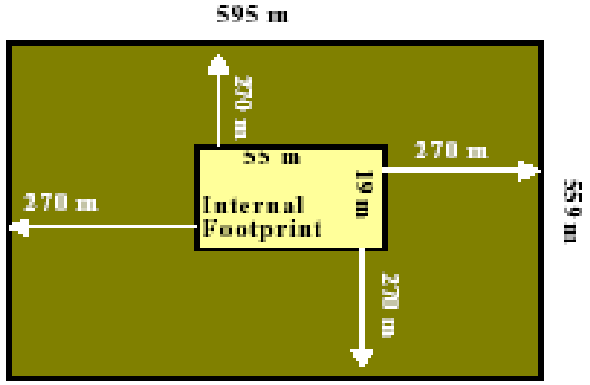
Explosive Safety



Each M109 is uploaded with:	Each FAASV is uploaded with:
22 DPICM, D563	59 DPICM, D563
8 HE, D544	19 HE, D544
3 ILLUM, D545	6 ILLUM, D545
3 SMK, D550	7 SMK, D550

Per Chapter 14, DA Pam 385-64, the explosives weight of hazard class 1.3 items (propelling charges, illuminating projectiles) and hazard class 1.4 (small arms ammunition) are not included in the Net Explosives Quantity (NEQ) calculations. Fuzes which can be hazard division 1.1 are not included in these calculations due to the minimal explosives content. For this upload configuration, the NEQ used for the M109 is 121 kgs and for the FAASV is 306 kgs.



External Footprint

Appendix L

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Explosive Safety

- ✓ **First: Must determine Classification of PES.**

  - ➔ **Heavy Armor?**
    - **M1 Abrams**
    - **M2/M3 BFV w/25MM and/or small arms only**

  - ➔ **Light Armor?**
    - **M109 HWTZR**
    - **FAASV**
    - **M113 Mortar**
    - **M2/M3 BFV**
    - **M270 MLRS (Front & Sides Only)**

  - ➔ **Non Armored?**
    - **HEMMTTs**
    - **Trailers**
    - **MILVANs**
    - **Helicopters**
    - **Open Stacks of Ammo**

Explosive Safety

✓ Second: Must Determine N.E.W.

✓ **M109 (Light Armor)**

- ➔ 22 each DODIC D563(2.9) = 64 KGs
- ➔ 8 each DODIC D544(7.0) = 56 KGs
- ➔ 3 each DODIC D545 = 0 KG
- ➔ 3 each DODIC D550(.2) = 1 KG

TOTAL N.E.W.
121 KGs

✓ **FAASV (Light Armor)**

- ➔ 59 each DODIC D563 = 171 KGs
- ➔ 19 each DODIC D544 = 133 KGs
- ➔ 6 each DODIC D545 = 0 KG
- ➔ 7 each DODIC D550 = 2 KG

TOTAL N.E.W.
306 KGs

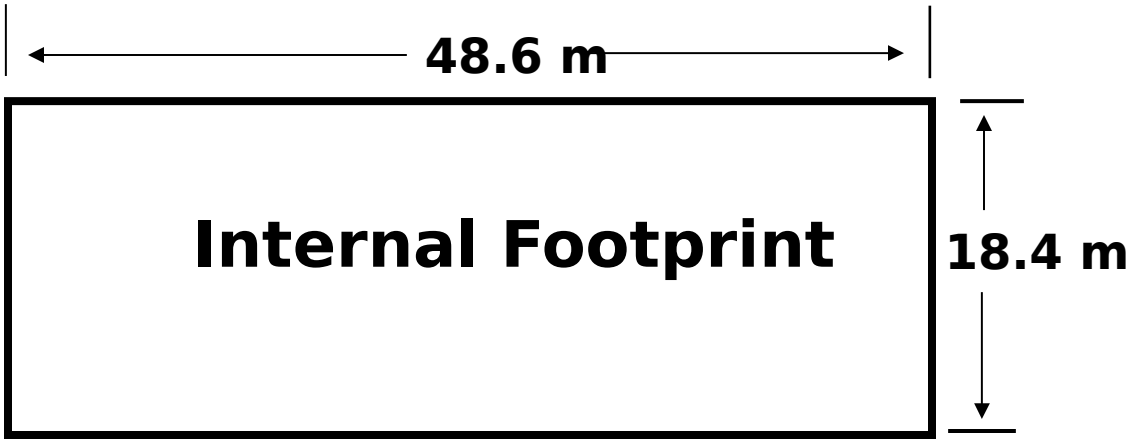
Explosive Safety

Third: Must Determine: Internal Footprint

- ➔ Light Armor to Light Armor = Col D1
- ➔ M109 with 121 KGs to M109 with 121KGS
- ➔ 4.1 Meters
- ➔ FAASV with 306 KGs to FAASV with 306 KGs
- ➔ 5.4 Meters

HORIZONTAL	VERTICAL
◆ 6 X M109s at 3.1 meters each = 18.6 meters ◆ 4 meters separation between M109s = 20 meters TOTAL = 38.6 ◆ 6 X FAASVs at 3.1 meters each = 18.6 meters ◆ 6 meters separation between FAASVs and to M109s = 30 meters TOTAL = 48.6 (30 + 18.6) greater of the two vehicle types	◆ 1 M109 Deep at 6.2 ◆ 1 FAASV Deep at 6.2 ◆ 6 meter separation between TOTAL 18.4 meters

Explosive Safety



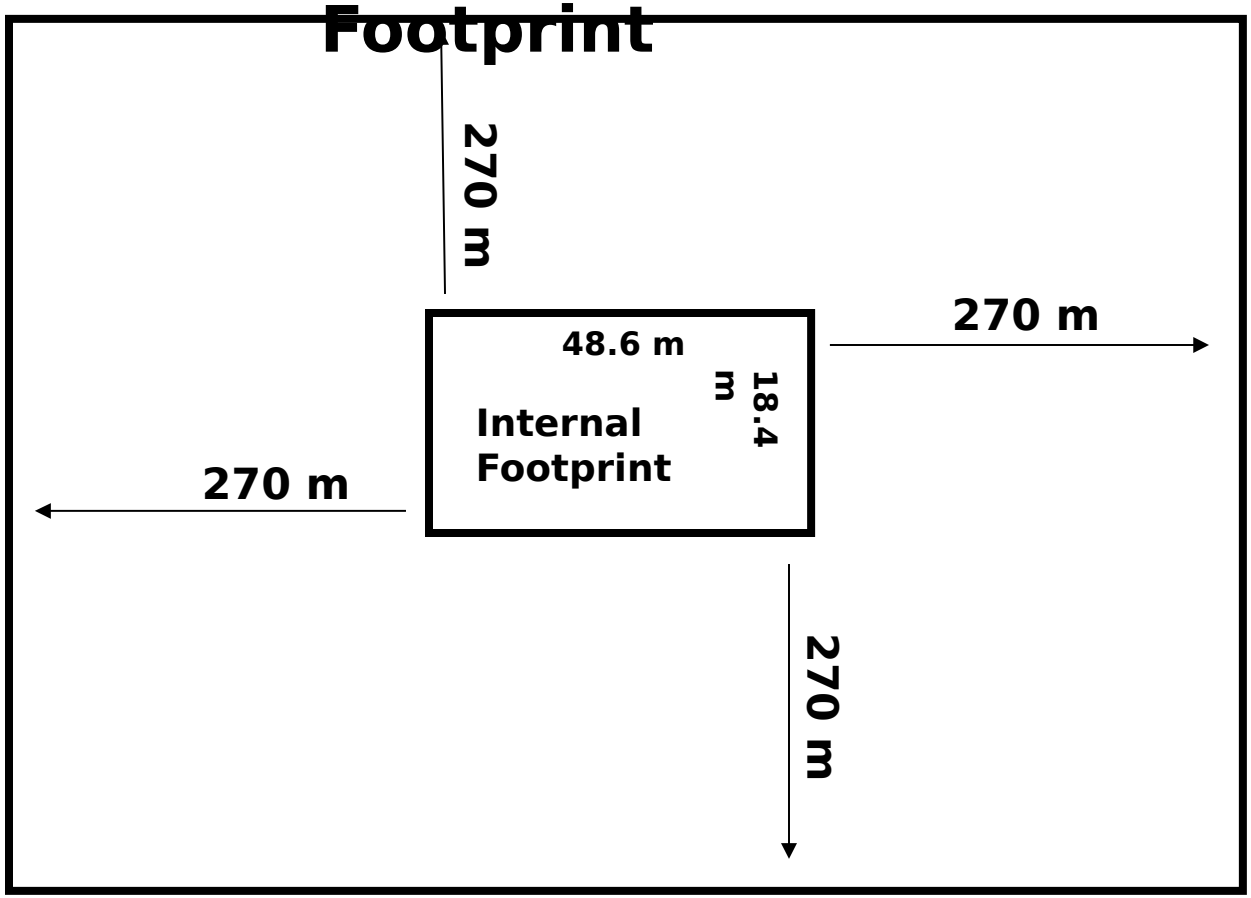
Explosive Safety

- **Fourth: Must Determine: External Footprint**

  - ➔**Light Armor to Inhabited Buildings = Col D5**
  - ➔**M109 with 121 KGs = 270 Meters**
  - ➔**FAASV with 306 KGs = 270 Meters**
  - ➔**Light Armor to Public Traffic Routes = Col D4**
  - ➔**M109 with 121 KGs = 180 Meters**
  - ➔**FAASV with 306 KGs = 180 Meters**

Both M109 and FAASV distance to Inhabited Buildings = 270 meters

Explosive Safety



What's Next?

- ✓ **Are the Vehicles violating the standard?**
- ✓ **Has the Appropriate Level of Command approved the violation?**
- ✓ **How can you affect change after the vehicles have been positioned incorrectly?**
- ✓ **Who do you talk to?**